

## ON THE TECHNIQUE OF OPERATIONS UPON THE HEAD AND NECK.

BY GEORGE CRILE, M.D.,  
OF CLEVELAND, OHIO.

Professor of Clinical Surgery in the Western Reserve Medical College; Surgeon to  
St. Alexia Hospital; Associate Surgeon to the Lakeside Hospital.

I WISH at once to restrict the rather too broad title of this paper to a consideration of the control of hæmorrhage in various operations upon the head and neck, and a discussion of the plan and extent of dissection in cases of malignant tumors.

*Hæmorrhage.*—Arterial and venous hæmorrhage are best considered separately. In the first stage of the operation for excision of the Gasserian ganglion, arterial hæmorrhage is of paramount importance; in the second stage, venous and capillary. In the excision of a goitre, venous hæmorrhage is more important than arterial. In most operations both factors are present. Surgical practice is at present divided as to the means of controlling each. In one clinic the patient is operated in the head-up posture, in another in the head-down posture, in another in the horizontal. Some surgeons in important operations place a permanent ligature upon the external carotid, others apply various methods of temporary closure, while still others depend upon local hæmostasis without any control over the main blood-supply. One still sees the practice of the older surgeons, consisting of a dashing operation, followed by quick packing and securing of vessels, disregarding for the moment the loss of blood. Obviously the methods of control of the arterial and venous hæmorrhage are almost diametrically opposed to each other. We will, therefore, first consider the control of the arterial hæmorrhage.

Four distinct methods may be considered. First, that of head-up posture, thereby diminishing the blood-pressure and the flow of arterial blood to the operative field. This

method is helpful, but, as frequently practiced, if the patient be under full anæsthesia, is attended with the danger of sudden and not-easily-controlled cerebral anæmia, because of the circulation not being sufficiently under control. If, on the other hand, the patient be not under full surgical anæsthesia the surgeon may be seriously hampered in his efforts at precise dissection. The risks on the one hand and the shortcomings on the other leave much to be desired by this method.

Second, permanent ligation of the external carotid artery. A study of the literature of this subject will show between two and three per cent. mortality from cerebral embolism alone. In many cases of malignant diseases of the neck the exposure and tying of this vessel requires dangerous handling of malignant tissue. The definite and needless risk of cerebral embolism and its danger in many malignant diseases seriously handicaps this procedure.

Third, the control of hæmorrhage from point to point by means of artery forceps. By this method a comparatively bloodless operation may be performed, but the objection to its employment is the laborious task of picking up so large a number of vessels in the major operations of the neck, thus requiring an increased length of time, and becoming a decided factor in the production of shock.

Fourth, the temporary closure of the common carotid or the external carotid, in the head-up inclined posture, the securing of each vessel as it appears, and the application of the pneumatic suit to prevent cerebral anæmia. This method embraces the points aimed at in the three preceding. The carotid is closed only temporarily.

In certain operations upon the scalp in which the division of this tissue is extensive, the blood-supply abundant, and perhaps in addition it is especially desirable to maintain a dry field, a very satisfactory anæmia on the plan of the Esmarch bandage may be obtained by the use of a double layer of rubber dam, this to be applied snugly upon the entire scalp, covering every part of the head, rendering the scalp completely bloodless. The free end may be tucked under like the

application of a turban, and the incision may then be made through the rubber dam, the latter affording a splendid protection to the operative field. This is in many respects more practical than the elastic tourniquet placed around the base.

*Venous Hæmorrhage.*—Aside from the use of a rubber dam turban as above described, we have no other means for general purposes for the control of venous hæmorrhage than that of the head-up posture. Venous blood-pressure is so responsive to posture that during anæsthesia one may readily develop even a negative pressure in an exaggerated head-up posture. It is true that the venous blood must still flow through the vessels and the veins will still bleed, but the tension in all vessels being much lowered, and in the larger ones becoming sometimes nil or negative, the amount of hæmorrhage on division of the veins is greatly diminished. The head-up posture under full anæsthesia presents two dangers which must be obviated. The first is air embolism; the second, cerebral anæmia. Air embolism can be avoided by accurate dissection, which is greatly favored by the clearer field afforded by the head-up posture and the closure of the main arterial supply. I have not seen an instance in my own experience. The dangers of cerebral anæmia may be virtually overcome by the employment of the author's rubber suit. (Fig. 1.) With the application of this suit the lower extremities and the trunk up to the costal borders may be so readily compressed that the possibility of the gravitation of too great an amount of blood into the splanchnic area and large vessels of the extremities may be excluded, and the dangers of cerebral anæmia virtually obviated.

In grave cases, by having an assistant skilled in the use of the sphygmomanometer make repeated estimations, the condition of the blood-pressure may be kept constantly in mind. A fall in the pressure below 90 mm. may in general be considered a signal to raise it by increasing the pressure in the pneumatic suit.

In operations upon the mouth, such as the excision of neoplasms involving the jaw, the mouth, the buccal mucosa,

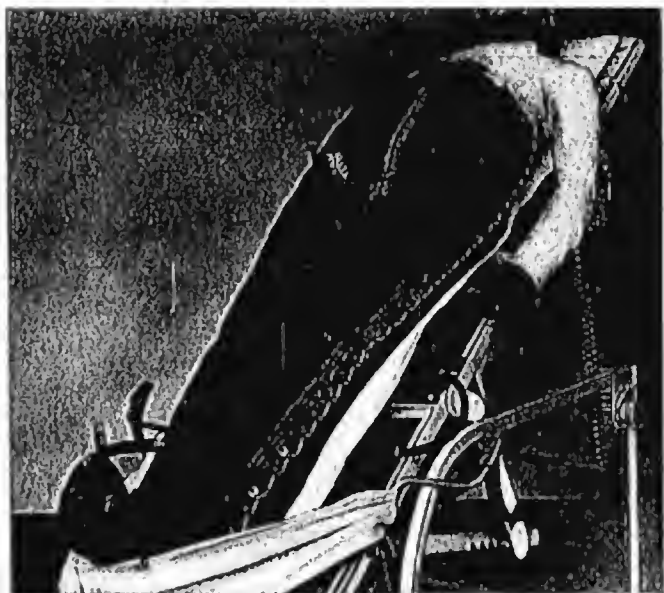


FIG. 1.—Rubber pneumatic suit in use.

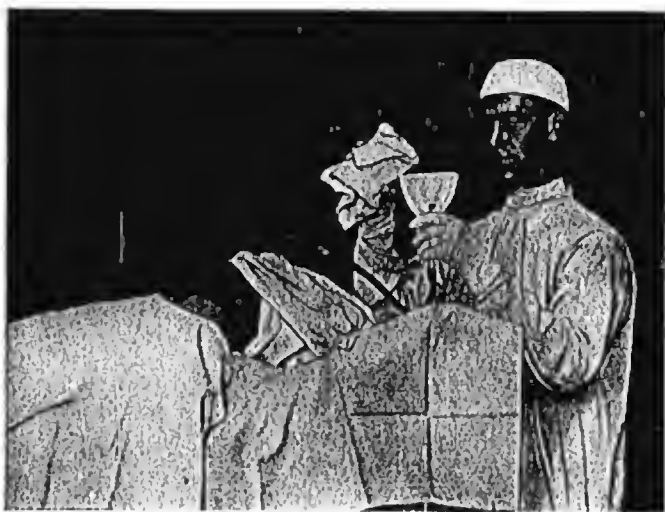


FIG. 2.—Tubage of the pharynx for use in anesthesia.

the floor of the mouth, the tongue, the hard and soft palate, the tonsils, and in cleft-palate operations, a simple method of tubage of the pharynx (Fig. 2) heretofore described, but more recently elaborated, has proven most satisfactory.

In operations upon the neck, face, and mouth, the factor of hæmorrhage, when the foregoing methods are fully employed, is almost wholly eliminated. There are several procedures, however, that demand special consideration. The first of these is the operation for excision of the Gasserian ganglion. This operation has justly acquired the distinction of being one of the most difficult in surgery almost wholly on account of the factor of hæmorrhage. In a personal experience in eighteen cases of excision of the ganglion I have had the opportunity of comparing various methods for the control of hæmorrhage. In the last eight cases the factor of hæmorrhage from the standpoint of its constitutional effect, and almost equally so from the standpoint of the obscuring of the field of operation, has been literally obviated. We have been able to do this operation with so little blood-loss that we have classed it with the comparatively bloodless operations. Quite as satisfactory has been the technic from the viewpoint of a clear field. We have been able to keep in view the ganglion from the beginning to the end of the operation, dividing all the branches and the posterior root in plain sight with scissors. The plan is as follows:

The patient is given a hypodermic injection of morphin and atropin thirty minutes before the time of operation. A skilled anæsthetist is provided. During the administration of the anæsthetic the pneumatic rubber suit is applied. After the patient is under surgical anæsthesia he is placed in the head-up inclined posture at an angle of  $45^{\circ}$ . (See Fig. 1.) This posture will cause a striking blanching of the face and neck. The common carotid artery is closed temporarily with the author's clamp and the rubber turban applied. We have now been secured against serious hæmorrhage from the scalp, brain and dura. The middle meningeal gives us no further

concern. It is a matter of no special consequence by what route we enter the skull so long as sufficient room is secured for the further technic. After the excision of the bone is completed and the dura exposed, the remaining source of hæmorrhage is venous. Innumerable small, thin-walled veins are opened at every turn. The oozing, while not rapid, is under ordinary circumstances just sufficient to constantly obscure the branches and the body of the ganglion. The control of this hæmorrhage, then, is the key to the entire situation.

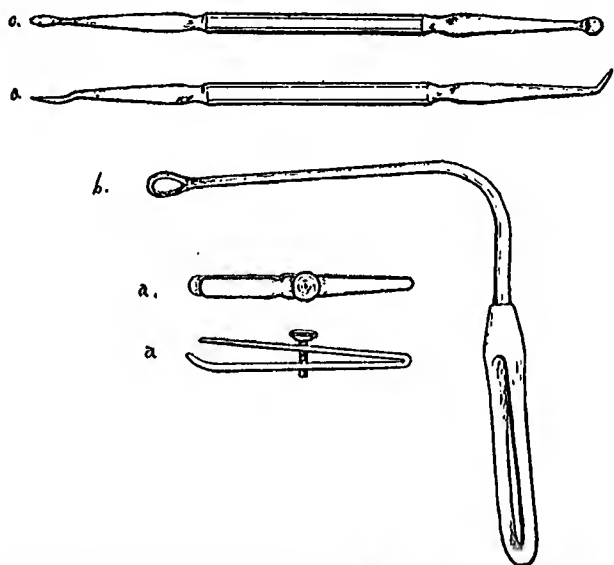


Fig. 3.—Special instruments for use in removal of the Gasserian ganglion. aa, clamps for temporary compression of the common carotid artery; b, ring retractors for venous compression; c c, blunt dissectors for elevating the ganglion.

Such control has been very satisfactorily accomplished by means of simple little retractors made of wire loops, in form like tongue retractors, the slender handles bent at right angles. Three or four of these may be required. The purpose of these retractors is that of pressing the end of a roll of sterilized gauze one inch wide, made of two layers folded in

so as to control loose threads. By means of these small wiring retractors and the little rolls of gauze a pressure zone surrounding the field in which the ganglion lies is established. This causes a local circular anæmia and the instruments are not in the way of the operator. As fast as the operation is advanced—*e.g.*, exposure and division of the third branch, the second, then the first, and the ganglion further raised up by means of a special little instrument, the small pieces of gauze are advanced and held firmly down by the retractors, thereby keeping the hæmorrhage constantly under control. During the latter part of the operation the field is as dry as that of a herniotomy. After a sufficient experience on the part of the operator and almost equally on the part of the first assistant, it is almost impossible to imagine any instance in which the hæmorrhage could not be controlled or the ganglion kept in sight and the entire dissection made under the eye.

The operation is usually completed within an hour. The patient during the operation will require but little anæsthesia. The brain anæmia and the morphia are in themselves almost sufficient, so that when the clamp is removed from the carotid and the patient again placed in the horizontal posture he comes out of the anæsthetic very quickly.

In the operation for cleft palate the use of the rubber tubes with packing of the pharynx permits the operator to work as continuously in this field as in a herniotomy or in an amputation. Furthermore, the patient does not inhale any blood. It is necessary here, however, to urge great care in packing the pharynx so low down as to give working space in the soft palate.

In excision of the tongue the same rule holds, the question of hæmorrhage becomes a very simple matter and the dissection can be carried on with the deliberation and care that is so necessary in an operation for excision of cancerous growths. The greatest advantage in the operative technic by the posture, the closure of the artery and tubage of the pharynx is experienced in excision of the tonsil for malignant disease. The operation is begun on the outside, a straight

incision being made over the sterno-mastoid. If any glands are enlarged a block dissection is made up to that point, and, finally, if the operation is to be done at one stage, a gloved forefinger is put inside the mouth so that bimanually the exact line of limitation and excision can be made out. The dissection then can be carried with the greatest precision straight through into the mouth and pharynx and the tongue separated without blood loss and without one drop of blood being inhaled into the broncho-pulmonary tract.

In laryngectomy, after the preliminary tracheotomy has been made, the inhalation of blood may be here absolutely avoided by passing a rubber tube of the simple respiration apparatus, similar to that used in the tubage of the pharynx heretofore alluded to, the tube being made to fit as closely as possible in the tracheotomy opening. The elasticity of the rubber tube and equal elasticity of the granulations which have moulded about the tracheotomy tube together with the vaseline applied upon the tube, make a watertight connection. However, it may not be entirely so and there may be reasons for removing this tube during the operation. It is best, therefore, to throw up a horseshoe flap of skin around this tube so as to make a gutter or drain, protecting the tracheotomy tube from the possibility of the entrance of any blood. The larynx may then be removed with as much deliberation, and certainly as independently of the anæsthetic and the anæsthetizer, as in any operation upon the extremities. When finally the trachea is to be divided there is even then no necessity of permitting the inhalation of any blood from the capillary oozing of the divided trachea.

*Plan of dissection in the excision of malignant tumors.*—From the development of the principles underlying the control of hæmorrhage and the management of the anæsthetic it seems to me that we have reached the strategic position in the technic of operations for cancer of the head and neck which permits us to at once lay aside all the conventional procedures and operate each case as a straight dissection referable only to the complete

excision of the primary focus and the metastases or probable metastases.

A rough-and-ready operation whereby a maxilla is torn out, the tongue lacerated, and tissues are crushed and bruised, while the patient is alternating between over-anæsthesia, and struggling, and inhaling blood (the conventional operation of the past), is substituted by a plan of quiet, continuous dissection in a clear field with little or no blood-loss. We should be able to perform operations upon the head and neck with precisely the same thoroughness, the same gentleness, in handling the infected tissues, as in cancer of the breast.

The lymphatic vessels are largely the determining factor in planning the technic for operations in malignant diseases. We are entirely justified in assuming that cancer is always in its beginning a local disease, and each case then must have a curable stage. In the earliest stage, when it is only just beginning, local excision may be sufficient, but it is safer to always remove the lymphatic bearing tissue immediately draining the focus. If, however, the cervical lymphatic glands are once involved by cancer metastases, then it matters little what the original source of the metastasis was, whether of the lip, the tongue, the cheek, or tonsils, the whole group of glands and gland-bearing tissue of that side of the neck should be sacrificed, and the key to the dissection is the sacrifice of the internal jugular vein. This vein is physiologically readily compensated for. Its excision is simple. If one tries to save the internal jugular they subject the patient to the great risk of having cancer-tissue manipulated and of leaving behind certain small glands or vessels in which cancer-cells may be lodged. When once a lymphatic gland is blocked and choked with cancer metastases, the further metastases may go in any direction. They may go back stream or by side anastomoses. It is necessary to remove the entire lymphatic-bearing tissue lying between the deep muscular planes of the neck, in which there are no lymphatic glands, and the platysma and skin, in which there are likewise no lymphatic glands. Starting from below upward, the internal jugular vein as well as the super-

ficial and the deep cervical fascia are divided, and when once the operation is well established in the deep plane of the neck the dissection from thence upward is simple.

Since adopting the radical bloc dissection the percentage of three-year cures have been more than quadrupled.

This paper is based upon experimental researches which have been heretofore published, and a clinical experience in 734 operations among which may be mentioned the following: Excision of Gasserian ganglion, 18; thyroidectomies, 108; trephining, 113; malignant tumors, 174; tubercular glands, 74; harelip and cleft palate, 28.